

MEDICAL THEORIES AND MEDICAL
SCIENCE IN THE EIGHTEENTH CENTURY

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MEDICAL THEORIES AND MEDICAL SCIENCE IN THE EIGHTEENTH CENTURY

Few periods in history have surpassed the Eighteenth Century in violent and extravagant contrasts. The Age of Reason was also the age of superstition and brutality. Pope and Voltaire, Rousseau and Linnaeus, Bach and Mozart all flourished at a time when the Tyburn Tree, bear-baiting, cock-fighting and Bedlam served to entertain England's polite society.

Eighteenth-Century Medicine is the microcosm of an age which was distinguished by paradox. Outrageous charlatanism and grotesque "polypharmacy" proliferated alongside great and exciting advances in medical science.

In order to set the scene of these advances it is first necessary to review some of the less reputable features of medical practice at that time.

Charlatanism

The age was prolific in quacks and mountebanks of every description, and many of them were under royal patronage and protection.¹ It is illuminating to consider a few of the more successful ones. Thus the century opens with the emergence of William Read, a tailor who became oculist to Queen Anne, and received a knighthood for his services. His Successor "Chevalier" John Taylor was, however, a much more colourful individual. He modestly described himself as the "Ophthalmiator Pontifical Imperial and Royal to Kings of England, Poland, Denmark and Sweden, The Electors of the Holy Empire and numerous other Princes of Royal Blood throughout Europe".

There were equally distinguished exponents of the other branches of irregular medical practice. Such a one was Joshua Ward - of "Pill" and "Drop" fame. A favourite of George II, he was a true general practitioner, proclaiming his powers of cure for all diseases. He thus differed from Joanna Stephens who concentrated upon dissolving "the stone". In 1739, she sold her secret remedy to the British Nation for £5,000. In order to raise this sum an appeal was launched under the auspices of the Prime Minister, the Noble Lords, William Cheselden, the eminent surgeon, and an entire Parliamentary Commission. The remedy was found to consist principally of black soap, calcined snails, honey and a variety of seeds.

Sarah Mapp is perhaps the best-known of the practitioners at this time, and she apparently possessed some genuine gifts as a bone-setter, A forerunner of the fashionable osteopaths of today, she enjoyed the patronage of Sir Hans Sloane and other distinguished contemporaries. She is immortalized together with "Chevalier" Taylor and "Spot" Ward in Hogarth's caricature - "The Arms of the Honourable Company of Undertakers". It is significant that Hogarth here indiscriminately portrays eminent members of the College of Physicians together with notorious quacks. Such was the popular image of Medicine at the time.

Towards the end of the century two other notable figures emerged. One of them was Gustavus Katterfelto who specialised in curing influenza, and in performing electrical experiments with black cats. His demonstrations with the "Solar Microscope" are of some

interest, however, and will require further mention. James Graham is the last of the fashionable Eighteenth-Century quacks in Britain who is worthy of mention. He is remembered mainly for his Temple of Health, where the female deities in attendance included the future Emma Hamilton, and an inner sanctum enshrined the "Grand Celestial Bed". His paradoxically ascetic system of treating disease and preserving health involved immersion in earth, and the practice of starvation. This regimen seems to have inspired later movements of the "Nature Health Cure" type.

Charlatanism was equally prevalent abroad. Mesmer, a qualified physician, is probably the most famous of the foreign practitioners. His work was not, however, entirely fraudulent, and will merit further attention. The American Elisha Perkins was a more blatant quack, and his "metallic tractors" were widely-used as a panacea at the end of the century. Perkins' "tractors" - skilfully caricatured by Gillray - exploited the widespread interest in electrical phenomena, just as Katterfelto and Graham had done a little earlier in the century.

The significant feature in this chronicle of quackery is that the perpetrators were nurtured and supported by the most distinguished members of Eighteenth-Century Society. The luminaries of the professions jostled with Fellows of the Royal Society at the public demonstrations of Katterfelto, Graham and their colleagues. One of the most remarkable features of the Eighteenth-Century scene is indeed the gullibility of its leading public figures.

The standard of professional ethics and etiquette amongst orthodox practitioners was often little better than that of the mountebanks. Even the distinguished physician and obstetrician John Leake was guilty of blatant advertising in his authoritative text-books, which appeared in the second half of the century. Thus in his "Chronic Diseases peculiar to Women" ("for the Use of those affected with such Diseases, as well as the Medical Reader.")² He follows the page of dedication to the Duchess of York with a page of elaborate notices of his latest works. In so doing, he cunningly draws attention to his proprietary rights in "the Lisbon Diet - Drink and its Extract, In the cure of Venereal Disease and Scurvy; the Rheumatic Gout, and all such Disorders as proceed from an impure state of the blood ...". A few pages further on, he adds the essential information, "Dr. Leake's hours for advice, at his House in Parliament Street, are from ten to twelve o'clock". These, and greater excesses, continued, however, until the end of the Nineteenth Century, as can be appreciated by glancing at advertisements in Victorian newspapers, or at the complaints which appeared with regularity in the Lancet.

Herbals and Polypharmacy

An insight into the science of therapeutics in the Eighteenth Century is readily obtained from standard textbooks of the period.

Joseph Tournefort's Institutiones rei Herbariae, published in 1700, was a great advance in botanical classification. Linnaeus, indeed, profited from this work to a greater extent than he admitted. As a

THE COMPLEAT
HERBAL:

OR, THE
Botanical Institutions
OF
MR. *TOURNEFORT*,

Chief Botanist

To the late *French* KING.

Carefully translated from the Original Latin.

With large Additions from *Ray, Gerarde,*
Parkinson, and others, the most celebrated Moderns.

To which are Added,

Two Alphabetical INDEXES; One, containing the
Names; the Other, the Physical Vertues and Uses of the
several PLANTS.

Illustrated with about Five Hundred Copper Plates, containing
above Four Thousand different Figures, all curiously Engraven. A
Work highly Instructive, and of general Use.

VOL. I.

With a short Account of the Life and Writings of the AUTHOR.

LONDON:

Printed for R. Bonnicke, Tim. Goodwin, John Walshoe, S. Wotton, Sam. Marshall,
Rich. Whitin, Benj. Tooke, Ralph Smith and Tho. Ward; and are to be Sold by T.
Morphew near Stationers-Hall. 1719.

herbal the work had a considerable influence on British *Materia Medica*, notably after the appearance of the English translation in 1719, entitled "The Compleat Herbal".³ Its value in this respect can be judged from a typical entry, under the herb purslane which

"restrains the Boiling of the Bile; and is therefore proper in putrid and malignant Fevers, in Heat of Urine and in the Scurvy. It is an Enemy to Lust, and hinders venereal Dreams and nocturnal Pollutions; and therefore ought to be recommended to such as love Chastity, or such as are too rampant in Feats of Love; I am sure it would be more proper for Monks and Nuns, and such as have devoted themselves to a single Life, than a Fish or Egg diet, or all the Cords and Halters with which they belabour their fat Sides over frequent Use of it extinguished the Heat and Vertue of natural Procreation. So that if any one is troubled with a Priapism, or has the Flames of Love burning too hot in his Breast or elsewhere, he knows where to find a Cure. The Females are cloathed with a natural Modesty, which renders them so amiable in the Eyes of Men, and do not stand in Need of any Antidote against this Poison".

Tournefort's next observation is, however, of more practical value, for he tells us that

"The Juice of the Herb is singularly good in Inflammations and Ulcers in the Secret Parts of Man or Woman, being conveyed into the Parts by a Syringe".

In 1730, Thomas Fuller's "Pharmacopoeia" was published in an improved edition "For the Assistance of young Physicians".⁴ It is in the best Galenical traditions, and still abounds in sympathetic magic, in crab's eyes, "dragon's blood" ("in tears", or "dry"), horse and pigeon's dung, spider's webs and "Priapus of the Sea Horse". A few examples from the "Thousand Select Prescripts" may serve as illustration. The directions for "Icteric Ale" are,

Pharmacopœia Extemporanea :

OR, A

B O D Y

O F

M E D I C I N E S,

CONTAINING

A Thousand Select Prescripts,

ANSWERING

Most Intentions of C U R E.

To which are added,

Useful *Scholia*, a C A T A L O G U E of
REMEDIES and Copious INDEX.

For the Assistance of young Physicians.

By THOMAS FULLER, M.D. Cantab.

THE FOURTH EDITION.

Mille mali species? Mille salutis erunt.

L O N D O N.

Printed for W. INNYS, at the West End of St.
Paul's Church-yard, MDCCLXXX.

Hy-royal, Rue, each 2 Handfuls; Seeds of Daucus, Angelica (or of wild Parsnip) each 2 Ounces; Filings of Tin (tied up in a Rag) half a Pound; dispense all for a Bag.

Women obnoxious to Vapours, should make it their constant Drink; or at least take it 3 times a Day for a good while.

Icteric Ale.

Take Shavings of Ivory 1 Ounce; white Harehound 4 Handfuls; boil in 6 Gallons of new Wort to 4; into which hang the unwritten Ingredients in a Bag.

Take Roots of sharp-pointed Dock half a Pound; Turmeric, Maddar, each 2 Ounces; of Nettles 4 Ounces; Herbs of Calandine, Cleavers, Strawberries (Leaves and Roots) Barberry-rinds, each 4 Handfuls; fresh Sheep's Dung (ty'd up in a Rag) 4 Ounces; live Millepedes 1 Pint; Filings of Steel 1 Pound; prepare all fit for Use.

It enriches and exalts poor watery Blood, corrects crude Juices, freeth the Liver from Obstructions, and cureth Cachectic and Icteric Persons.

Juniper Ale.

Take Juniper-Berries (well bruis'd and broken) 4 Ounces; Raisins half a Pound; mix for 4 Gallons.

It's very grateful both to the Palate and Stomach, breaks off Wind, cleanseth the Blood

Reins,

"Take shavings of Ivory 1 ounce; white Horehound 4 Handfuls; boil in 6 Gallons of new Wort to 4; into which hang the unwritten Ingredients in a bag.

Take Roots of sharp-pointed Dock half a pound; Turmeric, madder, each 2 ounces; of Nettles 4 ounces; Herbs of Celandine, Cleavers, Strawberries (Leaves and Roots), Barberry-rinds, each 4 Handfuls; fresh Sheep's Dung (ty'd up in a Rag) 4 Ounces; live Millipedes 1 pint; Filings of Steel 1 pound; prepare all fit for Use.

It enriches and exalts poor watery Blood, corrects crude Juices, freeth the Liver from Obstructions, and crueth Cachectic and Icteric Persons."

For a Cephalic Infusion we must "Take dry Peacocks Dung (the white Part) 4 Ounces; Millipedes alive bruised 1 Ounce; Black Cherry-water, white Wine, each 1 Pint and half; let them stand cold 24 Hours, then having clarified it, by often passing it through a Flannel Bag, and Langius's Antepileptic Water 3 Ounces; Spirit of Lavender compound 1 Dram and half; Oil of Nutmeg 3 Drops; Syrup of Piony compound 6 Ounces; mix.

It cleanses out the Meatus of the Brain, when choak'd up and grown unpassable by reason of muddy Feculencies; roborates its Tone when flaccid and sunk, and defecates the Animal Spirits when clogg'd and incens'd with an heterogeneous Copula; refreshes and invigorates them when feeble and fainting; discusses the Mists and Clouds of the Head, and procures Serenity and Sun-shine: Therefore we employ it with happy Success in an Idiopathic Head-ach, Vertigo, Scotomy, &c. giving a quarter of a Pint Nights and Mornings."

By comparison there is a noble simplicity in

"A Fume for Falling out of the Uterus.

Take Beetles 3 Drams; Eel-skins minced small 1 Dram; make a Powder."

The directions for use are given under a different "Fume", and are: "the Smoak ... (cast upon Coals) is to be received through a perforated Chair."

Even Fuller was unhappy about one of the items he describes. Under Cinnabar Pills "against an Epilepsy and Convulsion Fits", the inclusion of "Human Cranium, 2 Drams;" was

"in Compliance with the Custom of Practice; but for my own part I declare I abominate it: For I take Man's Skull to be not only a mere dry Bone, void of Virtue, or any manner of Effect, but also a nasty, mortify'd, putrid, carrionish Piece of our own Species, Man: And to take it inwardly, seems such a horrible, execrable Fact, that even Anthropophagi would shiver at it! And therefore, in my Opinion, 'twould be decent, and almost pious, to carry them all out of the Shops, and

Ossa sepulchrali contumulare domo"

Fuller was not averse to philosophical disputation, as can be seen in his comments under "A Diuretic Oleose Draught". After discounting Van Helmont's view that drugs taken by mouth cannot act upon the urinary tract, he presents evidence from Hoechstetter and Diemerbroeck

"that tho' Anatomy hath not discovered any other Way for the Urine, but through the Blood; yet there may be a nearer Cut from the Stomack and Intestines, by the Convenience of which Remedies may come entire, or but little alter'd, to the Reins and Ureters."

Further evidence is available, for "Authors give Accounts of Pins, Needles, a Bodkin 4 inches long, an Iron Key, a Bullet, Quicksilver, Beards of Barly, Pieces of Mushrooms, Lettice, Smallage-root, Raisin Stones, whole Anise, Melon, and Winter Cherry-Seeds, coming away with the Urine. Now, since it is utterly impossible for these to pass round with the Blood, and through the Kidneys, it must needs be (sic) that there are peculiar Water-Passages from the Stomach, or Intestines, which missing the Kidneys, fall directly into the Bladder; and tho' they are not yet discovered to the Eye, so neither are those that carry Milk to the Dugs."

One of the few items of pharmacological interest in

Fuller's collection is "Asthmatic Syrup" which contains

"Fox-glove Flowers fresh gathered in the Month of May, 2 Ounces (that is about 200); Waters of Hyssop, and Pennyroyal, of each half a Pint; give them a close

hot infusion for an hour".

Seven other ingredients are then added. The weight and number of the foxglove flowers are incompatible but it would be interesting to assay the amount of active digitalis extract present in the recommended dose of "a Spoonful". Perhaps cardiac forms of asthma did receive benefit from this syrup; if so, this is an early use of digitalis other than as an emetic or for topical application.

Another author who remained popular in the Eighteenth Century was Nicholas Culpepper, "Gent. Student in Physick and Astrology." His chief work, "The English Physician", had first appeared in the mid-Seventeenth Century. At that time, Culpepper had just produced an English translation of the "Pharmacopoeia Londonensis" in which he criticised freely and justly some of the more bizarre items. This criticism resulted in some useful modifications to later editions of the Pharmacopoeia.⁵ The "English Physician" was reprinted at regular intervals, without any changes. Thus the 1741 edition ⁶ is identical to the edition "Printed for the Booksellers. 1785." Modified editions have, indeed, been published even in the present century; but by this time the work was clearly intended for those who Culpepper himself describes as "the Vulgar ... so long trained in such Egyptian Darkness, even Darkness which to (their) Sorrow may be felt". The work was still influential, however, in the early part of the Eighteenth Century when

many medical men agreed with Culpepper that "Physic without Astrology (is) like a Lamp without Oil". The principles seem simple enough:

- "1. Fortify the Body with Herbs of the Nature of the Lord of the Ascendant, it is no Matter whether he be a Fortune or Infortune in this Case.
2. Let your Medicine be something antipathetical to the Lord of the sixth.
3. Let your Medicine be something of the Nature of the Sign ascending.
4. If the Lord of the Tenth be strong, make use of his Medicines.
5. If this cannot well be, make use of the Medicines of the Light of Time.
6. Be sure always to fortify the grieved Part of the Body by sympathetical Remedies.
7. Regard the Heart, keep that upon the Wheels, because the Sun is the Foundation of Life, and therefore those universal Remedies, Aurum Potabile, and the Philosopher's Stone, cure all Diseases by fortifying the Heart."

One is not, therefore, surprised to find, in the main body of the work, advice such as that under "Crabs Claws 'Tis a Plant under the Dominion of Venus, and therefore a great Strengtheners of the Reins; it is excellent good in that Inflammation which is commonly called St. Anthony's Fire; it assuageth all Inflammations, and Swellings in Wounds; and an Ointment made of it, is excellent good to heal them; there is scarce a better Remedy growing than this is for such as have bruised their Kidneys, and upon that account pissing Blood; a Dram of the Powder of the Herb taken every Morning, is a very good Remedy to stop the Terms."

Robert James, the inventor of the celebrated Fever Powder, did much to sweep away the mediaeval dross which disgraced the pharmacopoeias of his day, and which benefitted only the apothecaries. In his excellent "New Universal English Dispensatory" of 1764,⁷ James denounced "the Custom for

the Writers of Dispensatories to embarrass their Compositions, and for Physicians to overload their Prescriptions, with a great Number of superfluous Ingredients; and hence the Efficacy of Medicines was rendered less certain, and the Practice of Physic more precarious." He pledged himself "to reduce this luxuriance within the Bounds of Sense and Science; to prune away the Branches of Physic which bear no Fruit, and to restore the Art to that useful Simplicity which alone is productive of Pleasure and Advantage."

James favoured "Simples" and "The Capital Medicines; such as the Bark, Mercury, Antimony, and ... Waters both mineral and common"; also he approved of "the plain and useful Medicines of the Edinburgh Pharmacopoeia Pauperum". He praised, too the "Edinburgh Dispensatory" for omitting "those pompous and unmeaning Compositions the Theriaca and Mithridate, of which we have so often expressed our Dislike". William Heberden, the Elder, had also battled valiantly against these two extraordinary antidotes.

One of the few great advances in medical treatment during the Eighteenth Century was due to an Edinburgh graduate, William Withering. His careful application of the folk-medicine, foxglove tea, in cases of oedema, which he showed to be of cardiac origin,⁸ is one of the most important therapeutic advances in the history of Medicine. It is perhaps equalled only by the introduction into Europe of "The Bark" in the Seventeenth Century, and by the discovery of insulin, sulphonamides and antibiotics in recent times.

Although medical treatment made few striking advances in the Eighteenth Century, the same cannot be said of surgical treatment in an age possessing such giants as Cheselden, Pott and John Hunter. The Obstetrical Art, too, was making great progress at this time, with Giffard, Smellie and Denman, in England, rescuing the practice of midwifery from the control of ignorant and dangerous female practitioners.

Above all, however, the Eighteenth Century was an age of contrasting general hypotheses of disease and treatment, of advances in clinical science, and of great discoveries in the basic medical disciplines.

Medical Philosophies

During this period there was a notable conflict between metaphysical hypotheses and concepts firmly based on the flourishing natural sciences.

At the beginning of the century, as in the preceding fifty years, Medicine was dominated by materialistic views. These had been stimulated by the important Seventeenth-Century discoveries in chemistry, physics and physiology, superimposed upon the anatomical knowledge of the Sixteenth and Seventeenth Centuries. Iatro-physical notions of the body as a complex machine were still influential, but, despite the "iatro-mathematical" work of Pitcairne, they had already lost much of the momentum imparted by Sanctorius and Borelli, and by Cartesian "dualist" philosophy. The iatro-chemical concept of the body as a

busy chemical laboratory was, however, more influential. Based on the ideas of Van Helmont, and developed principally by Sylvius and Willis, it has evolved triumphantly into modern biochemistry. In the Eighteenth Century, Boerhaave and his disciples did much to propagate this doctrine.

It was Stahl of Halle who led the inevitable reaction against these powerful materialistic views.⁹ Stahl postulated a spiritual entity "anima" - which ruled over the physical body and directed all its activities. Putrefaction could take place only when "anima" left the body after death. "Anima" was clearly not very different from the Greek "pneuma" and other similar concepts of earlier times.

The idea was developed later in the century by Joseph Barthez in the doctrine of "Vitalism". This invoked the familiar "life force" in a new guise.

Concepts such as those of Stahl and Barthez emerge imperceptibly with the beginnings of modern "psychosomatic" medicine.

Friedrich Hoffmann, Stahl's colleague at Halle, formulated a doctrine which could more readily be applied to medical practice than "anima" or "vital principle". In Hoffmann's philosophy, the universe was filled with an intangible substance which held the body in a delicate tonic state of balance. Deficiency or excess of "tonus" resulted

in disease. Treatment was readily effected by the use of sedatives in the acute hypertonic states, and by the exhibition of "Tonics" in the more chronic states due to atony.

Later in the century, Hoffmann's views were re-expressed by John Brown, who was at first the protégé, but later the bitter enemy of Cullen in Edinburgh. The "Brunonian System" held that normal health was the result of a correct admixture of stimuli received by the body. Consequently, inadequate stimulation was said to produce "asthenic" diseases, whereas excess stimulation caused "sthenic" disease. For the treatment of the more common "asthenic" group of diseases, large doses of stimulating drugs were required. This was a dangerous doctrine, and it undoubtedly resulted in numerous therapeutic disasters.

Another, equally pernicious doctrine emanated from Edinburgh at the end of the century. Mainly concerned with the treatment of fevers, which then accounted for the bulk of medical practice, this "Antiphlogistic" doctrine advocated the systematic draining of the body's resources. Its chief exponent was James Gregory who had succeeded Cullen in the Chair of the Practice of Medicine, and was unfortunately a most persuasive teacher. In particular, Gregory recommended heroic purging and blistering, vigorous and repeated blood-letting, and the free use of tartar emetic - all of which were to render the body incapable of supporting a fever.

The baneful influence of Gregory and Brown persisted into the second half of the Nineteenth Century, as can be seen from the treatment meted out to the Edinburgh surgeon, Patrick Heron Watson, when he developed typhus and dysentery in the Crimean War. ¹⁰

It was appropriate that another Edinburgh Professor, John Hughes Bennett, was to cause the final overthrow of these barbaric methods with his treatise on "The Restorative Treatment of Pneumonia" published in 1865.¹¹ Here, Bennett showed convincingly that "supportive" therapy was vastly superior to the Brunonian and "Antiphlogistic" regimes.

At the close of the century, there arose a new concept of treatment which was diametrically opposed to the Brunonian and "Antiphlogistic" Systems. It was introduced by Samuel Hahnemann and still flourishes as homeopathy. In Britain, indeed, the system enjoys official Royal patronage. Although rooted in the late Eighteenth Century, this doctrine was not fully presented until 1810, when Hahnemann's Organon der rationellen Heilkunde appeared.¹² Hahnemann held that a disease should be treated with very small doses of a drug, which, in healthy individuals, would itself produce symptoms and signs of the disease. The body was supposed to be abnormally sensitive, in the diseased state, to minute doses of the homologous drug. Homeopathy, from its inception, has provoked reactions which range from religious devotion to

hostility and derision. Qualified medical practitioners who favour this system have generally been shunned by their orthodox (or "allopathic") colleagues. Thus, in 1851, the Professor of Pathology at Edinburgh was the subject of much obloquy, and received an official reprimand for putting into practice Hahnemann's Teachings. Homeopathy, nevertheless, has had three useful functions. In the first place it helped to establish pharmacology as a true science, by demanding scrupulous observations upon the action of individual drugs, used in carefully defined doses. Secondly, Hahnemann's emphasis on the administration of one drug at a time was a notable departure from the widespread practice of polypharmacy, which has been discussed earlier. The third virtue of homeopathy lay in its effect as a curb to the exuberant use of drugs which had culminated in the Brunonian System. In addition, homeopathy is sometimes held to have been the first theory which provided a rational basis for prophylactic immunisation against infectious disease. The related phenomena of desensitisation, used in the management of allergic diseases, can be adduced as another good example of homeopathy at work.

Perhaps the most endearing of medical philosophers in the late Eighteenth Century was the English country doctor - Erasmus Darwin. "The Botanic Garden" ¹³ is one of the happy results of Darwin's labours in natural history. This

extraordinary poem, though mercilessly ridiculed in "The Anti-Jacobin", ¹⁴ is of considerable interest. The generous footnotes and appendices, themselves encompass the entire field of the natural sciences. In particular, the second volume deals with the comparative physiology of reproduction in a very lucid manner. The work is embellished, too with superb allegorical plates by Blake and Fuseli. Of greater importance in the present context, is "Zoonomia", ¹⁵ first published between 1794 and 1796 - towards the end of Darwin's life. In his preface, Darwin surprisingly finds it necessary to justify the cultivation of medical theory. He writes,

"There are some modern practitioners, who declaim against medical theory in general, not considering that to think is to theorize; and that no one can direct a method of cure to a person labouring under disease without thinking, that is without theorizing; and happy therefore is the patient, whose physician possesses the best theory."

Further justification for theorizing is provided:

"The want of a theory ... to conduct the practice of medicine is lamented by its professors; for, as a great number of unconnected facts are difficult to be acquired, and to be reasoned from, the art of medicine is in many instances less efficacious under the direction of its wisest practitioners; and by that busy crowd, who either boldly wade in darkness, or are led into endless error by the glare of false theory, it is daily practised to the destruction of thousands; add to this the unceasing injury which accrues to the public by the perpetual advertisements of pretended nostrums; the minds of the indolent become superstitiously fearful of diseases, which they do not labour under; and thus become the daily prey of some crafty empyric."

Mr ZOOLOGIA; *Beatty*

OR,

May THE LAWS *1802*

OF

ORGANIC LIFE.

IN FOUR VOLUMES.

By ERASMUS DARWIN, M.D. F.R.S.

AUTHOR OF THE BOTANIC GARDEN.

Principiū cælum, ac terras, camposque liquentes,
Lucentemque globum lunæ, titanisque astra,
Spiritus intus alit, totamque infusa per artus
Mens agitat molem, et magno se corpore miscet.

VIRG. Æn. vi.

Earth, on whose lap a thousand nations tread,
And Ocean, brooding his prolific bed,
Night's changeful orb, blue pole, and silvery zones,
Where other worlds encircle other suns,
One mind inhabits, one diffusive Soul
Wields the large limbs, and mingles with the whole.

VOL. I.

THE THIRD EDITION, CORRECTED.

LONDON:

PRINTED FOR J. JOHNSON, IN ST. PAUL'S CHURCH-YARD.

1801.

T. Bingley, Printer, Bolt Court, Fleet Street.

it is not impossible, but the great variety of species of animals, which now tenant the earth, may have had their origin from the mixture of a few natural orders. And that those animal and vegetable mules, which could continue their species, have done so, and constitute the numerous families of animals and vegetables which now exist; and that those mules, which were produced with imperfect organs of generation, perished without reproduction, according to the observation of Aristotle; and are the animals, which we now call mules. See Botanic Garden, Part II. Note on Dianthus.

Such a promiscuous intercourse of animals is said to exist at this day in New South Wales by Captain Hunter. And that not only amongst the quadrupeds and birds of different kinds, but even amongst the fish, and, as he believes, amongst the vegetables. He speaks of an animal between the opossum and the kangaroo, from the size of a sheep to that of a rat. Many fish seemed to partake of the shark; some with a skait's head and shoulders, and the hind part of a shark; others with a shark's head and the body of a mullet; and some with a shark's head and the flat body of a sting-ray. Many birds partake of the parrot; some have the head, neck, and bill of a parrot, with long straight feet and legs; others with legs and feet of a parrot, with head and neck of

The four substantial volumes contain the most extraordinary variety of material, ranging - as the sub-title promises - through the whole of "Organic Life". The first part deals with "The immediate causes of animal motions deduced from their more simple or frequent appearances in health, and applied to explain their more intricate or uncommon occurrences in diseases." It draws upon recondite material from the entire animal and vegetable kingdoms. The first volume ends with a complex account of diseases held to be due to "retrograde motions of the absorbent systems". The peroration closes with the uncompromising lines:

"... if you are not yet convinced of the truth of this theory, hold, I entreat you, your minds in suspense, till ANATOMY draws her sword with happier omens, cuts asunder the knots, which entangle PHYSIOLOGY; and, like an angur inspecting the immolated victim, announces to mankind the wisdom of HEAVEN."

Darwin's general theory was devised "above twenty years" before the publication of "Zoonomia". In Darwin's opinion

"It happened, perhaps unfortunately for the inquirers into the knowledge of diseases, that other sciences had received improvement previous to their own; whence, instead of comparing the properties belonging to animated nature with each other, they, idly ingenious, busied themselves in attempting to explain the laws of life by those of mechanism and chemistry; they considered the body as an hydraulic machine, and the fluids as passing through a series of chemical changes, forgetting that animation was its essential characteristic."

This reaction against wholly materialistic theories is reminiscent of Stahl. Darwin is, however, less mystical, and regards the manifestations of life as a series of

animated motions - often of a most subtle nature. His theory of disease is also straightforward:

"All diseases originate in the exuberance, deficiency, or retrograde action, of the faculties of the sensorium, as their proximate cause; and consist in the disordered motions of the fibres of the body, as the proximate effect of the exertions of those disordered faculties."

Remote, secondary effects are often due to sympathetic influences, notably on the blood vessels.

Applying these hypotheses, Darwin presents in his last two volumes a novel, aetiological classification of disease, giving detailed consideration to clinical features and treatment. He strives here to correct the main theoretical inconsistencies in the schemes of Cullen and Sauvages.

In a supplement, Darwin develops an intricate "sympathetic theory of fevers" describing how disturbances of motion in one part of the body can, at a distance, produce the various types of fever. He rightly concludes,

"It would assist us much in the knowledge and cure of fevers, if we could always determine, which part of the system was primarily affected".

He distinguishes his "sympathetic theory" from "The mechanic theory" of Boerhaave, "the spasmodic theory" of Hoffmann and Cullen, and "The putrid theory" of Pringle.

Darwin prefaces the final part of his work with characteristic modesty:

"In this arduous undertaking the author solicits the candour of the critical reader; as he cannot but foresee, that many errors will be discovered, many additional species (of disease) will require to be

inserted; and others to be transplanted, or erased. If he could **expend** another forty years in the practice of medicine, he makes no doubt, but that he could bring this work nearer perfection, and thence render it more worthy the attention of philosophers. - As it is, he is induced to hope, that some advantages will be derived from it to the science of medicine ...".

The second volume remains perhaps the most important, containing, in the section "Of Generation", an astonishing preview of the theory of organic evolution which the author's grandson was to develop so brilliantly. The evolutionary concept is a central feature of "Zoonomia", and it gives validity to Darwin's free use of illustrative material drawn from the whole of "organic life". The following passage summarises his views:

"... it is not impossible, but the great variety of species of animals, which now tenant the earth, may have had their origin from the mixture of a few natural orders. And that those animal and vegetable mules, which could continue their species, have done so, and constitute the numerous families of animals and vegetables which now exist; and that those mules, which were produced with imperfect organs of generation perished without reproduction".

Darwin proceeds to anticipate in detail Haeckel's theory of Recapitulation; and, having dealt with the aetiology of congenital abnormalities, he develops the concept of genetic recombination. He continues, "When we consider all these changes of animal form, and innumerable others, which may be collected ... we cannot but be convinced, that the fetus or embryo is formed by apposition of new parts, and not by the distension of a primordial nest of germes, included one within

another, like the cups of a conjurer.

... When we revolve in our minds the great similarity of structure which obtains in all the warm blooded animals, as well quadrupeds, birds, and amphibians animals, as in mankind; ... one is led to conclude, that they have alike been produced from a similar living filament. In some this filament in its advance to maturity has acquired hands and fingers with a fine sense of touch, as in mankind. In others it has acquired claws or talons, as in tygers and eagles. ... And all this exactly as is daily seen in the transmuta~~ti~~ons of the tadpole, which acquires legs and lungs, when he wants them; and loses his tail, when it is no longer of service to him."

Darwin's view on the "gradual production of the species and genera" are so clearly presented that we can readily forgive his lapses into teleology, or his uncertainty as to whether "the animalcula in semine, as seen by the microscope, be all of them rudiments of homunculi ... perhaps they may be the creatures of stagnation or putridity". Here Darwin was bemused by the apparently convincing evidence which he cites for spontaneous generation.

The second volume ends with an admirable discussion on "the articles of the materia medica, with an account of the operation of medicines." Apart from the interesting pharmacological hypotheses advanced, there are good descriptions, of the use of digitalis, in which Darwin - like his friend

Withering - was a pioneer.

It is strange that Erasmus Darwin receives only passing mention in the standard works on medical history; he is, indeed entirely omitted from the leading British textbook.

Darwin's concluding lines might serve as an epitaph for Eighteenth-Century medical science as a whole:

"What I have thus delivered, I beg to be considered rather as observations and conjectures, than as things explained and demonstrated; to be considered as a foundation and a scaffolding, which may enable future industry to erect a solid and a beautiful edifice, eminent both for its simplicity and utility, as well as for the permanency of its materials, - which may not moulder, like the structures already erected, into the sand of which they were composed; but which may stand unimpaired, like the Newtonian philosophy, a rock amid the waste of ages!"

Clinical Science

Turning from these contrasting philosophies to improvements in the practice of physic during the Eighteenth Century, our attention is inevitably drawn first to Leyden and then to Edinburgh.

In the second half of the Seventeenth Century, Leyden had become the main centre of medical teaching, comparable with the schools of Salerno, Montpellier and Padua in former times. Such great teachers as Sylvius attracted students from all parts of Europe.

For the next hundred years, a particularly interesting relationship existed between Leyden and Edinburgh. Thus Robert Sibbald after studying at Leyden had returned to Edinburgh, and in 1681, was one of the prime movers in the foundation of the Edinburgh College of Physicians. In 1685, he was appointed

the first Professor of Medicine at the University. Archibald Pitcairne who was, likewise, a founder-member of the College of Physicians, and one of the original Professors of Medicine, was appointed Professor of Medicine at Leyden in 1692. During his stay in Holland he had amongst his pupils Hermann Boerhaave. In his turn, Boerhaave trained the men who brought about the transfer of influence from Leyden to the newly-founded Edinburgh Medical School, in the first half of the Eighteenth Century.¹⁶

Boerhaave was the true successor of Thomas Sydenham, whose memory he greatly revered. With their assiduous cultivation of the Hippocratic methods of clinical observation they laid the foundations of modern Medicine. Boerhaave's system of bedside teaching was, indeed, the most valuable heritage of the Edinburgh School at its inception.

Later in the century, Edinburgh's supremacy in general clinical teaching was enhanced by William Cullen. Usually regarded as the founder of the Glasgow School of Medicine, Cullen's best work was carried out in Edinburgh, where he occupied successively the Chairs of Chemistry, The Institutes of Medicine, and The Practice of Medicine. Cullen's influence as a teacher was greatly assisted by his revolutionary practice of lecturing in the vernacular, and also by his popular textbook "First Lines of the Practice of Physic", published in 1777. He is remembered, too for having emphasised the importance of the nervous system in disease. Here, Cullen was, in fact, developing Hoffmann's concept of "tonus" maintained by "nervous

S Y N O P S I S
NOSOLOGICÆ METHODICÆ,

C.c
f.12

EXHIBENS

CLARISS. VIRORUM
SAUVAGESII, LINNÆI, VOGELII, ET SAGARI,
SYSTEMATA NOSOLOGICA.

EDIDIT
SUUMQUE PROPRIUM SYSTEMA NOSOLOGICUM

ADJECIT

GULIELMUS CULLEN,

MED. D. ET IN ACAD. EDINB. MED. PRACT. PROF.
MEDICUS REGIUS APUD SCOTOS PRIMARIUS,
ET COLL. REG. MED. EDINB. SOCIUS;
NEC NON SOCIETATUM REG. LOND. PHILOS. EDINB.
PHILOS. PHILADELPH. MED. REG. PARIS.
MED. HAUNIENS. ET MED. EDINB.
SODALIS.

EDITIO TERTIA,
EMENDATA ET PLURIMUM AUCTA,

DUOBUS TOMIS.

T O M. I.

EDINBURGI:

Prostant venales, apud GULIELMUM CREECH;
et LONDINI, apud THOMAM CADELL,
et JOANNEM MURRAY, Bibliopolas.

M,DCC,LXXX.

ether". Undoubtedly, however, Cullen's main achievement in clinical science, was his Synopsis Nosologiae Methodicae, first published in 1769.¹⁷ In this work he classified diseases according to symptomatology. His model was the botanical classification of Linnaeus, and Cullen's system was a considerable improvement over that of Sauvages. Its influence on medical thought persisted during the first half of the Nineteenth Century. Thus we find, in the 1835 edition of the very successful textbook by George Gregory,¹⁸ the following eulogy:

"The arrangement of diseases follows in its general outline, and in many of its details, the NOSOLOGY of Dr. Cullen; a work of great value, to which I shall have frequent occasion to refer, and to whose various merits I shall find many opportunities of doing justice..... The great features ... of Dr. Cullen's system are retained, which being founded on a close observation of the phenomena of disease, will probably continue for ever to be the surest basis of any elementary view of THE THEORY AND PRACTICE OF MEDICINE."

To the Twentieth-Century spectator, however, Cullen's system seems in no way superior to that proposed in a very neglected work by "J. Allen, M.D." published in 1729.¹⁹ Despite Gregory's prophecy, symptomatology as the basis for classification has been replaced by aetiology; thus Erasmus Darwin's general system has prevailed.

Outside Edinburgh, the best traditions of Sydenham and Boerhaave were notably upheld by William Heberden ("The Elder").²⁰ His life spanned the entire Eighteenth Century, and his work epitomises, the finest medical practice of that period.

These advances in clinical medicine were aided by a number of improvements in diagnostic methods. Thus, early in the century, Boerhaave described methods for performing chemical tests upon urine. Clinical chemistry was in this way born out of the iatro-chemical labours of Sylvius, Willis and others. Another helpful tool for the clinician was the "physician's pulse-watch" introduced by Sir John Floyer in 1707. Towards the end of the century, the use of percussion in diagnosis - first described by Leopold Auenbrugger - was becoming widely known. The clinical thermometer, too, did not become popular until the end of the century when James Currie, the editor of Robert Burns' poems, described his cold water treatment for typhoid fever. Medical practice at the end of the century had to wait, however, a further nineteen years before Laënnec's stethoscope was added to the diagnostic armamentarium.

Eighteenth-Century Psychiatry

Diseased minds attracted far less attention than diseased bodies. The general attitude towards mental illness during the Eighteenth Century was still essentially mediaeval. The afflicted were regarded as members of a sub-human species to be chained and herded together promiscuously, and inspected as though in a menagerie. Hogarth's celebrated engraving of Bedlam, in his Rake's Progress series, was apparently a faithful representation of England's leading mental hospital

THE
English Malady:
OR, A
TREATISE
OF
Nervous Diseases of all Kinds,
AS
Spleen, Vapours, Lowness of Spirits,
Hypochondriacal, and Hysterical
Distempers, &c.

IN THREE PARTS.

- PART I. Of the Nature and Cause of Nervous Distempers.
PART II. Of the Cure of Nervous Distempers.
PART III. Variety of Cases that illustrate and confirm the Method of Cure.

With the AUTHOR's own CASE at large.

Facilis descensus Averni,
Sed revocare Gradum, superasque evadere ad Auras,
Hic Labor, hoc Opus est. Pauci quos Equus amavit,
Jupiter, aut ardens evexit ad Æthera Virtus
Dis Geniti potuere

VIRG.

By GEORGE CHEYNE, M. D.
Fellow of the College of Physicians at Edinburg, and F. R. S.

LONDON:

Printed for G. STRAHAN in Cornhill, and
J. LEAKE at Bath. M.DCC.XXXIII.

at that time.

This appalling popular attitude was shared by most of the medical profession. One exception was however, George Cheyne, an Edinburgh graduate who practised chiefly at Bath amongst sufferers from hypochondria. His book "The English Malady"²¹ was published in 1733, though written several years earlier. Its neglect by medical historians is undeserved for it contains much sound advice on "Nervous Diseases of all kinds, as Spleen, Vapours, Lowness of Spirits, Hypochondriacal, and Hysterical Distemper, &c." We learn that the book

"had certainly never appear'd (till its author had disappear'd) had it not been for the perhaps indiscreet ZEAL of some of my warmest Friends, who (upon the late Frequency and daily Encrease of wanton and uncommon Self-murderers, produced mostly by this DISTEMPER, and their BLASPHEMOUS and FRANTICK APOLOGIES grafted on the Principles of the INFIDELS, and propagated by their DISCIPLES) extorted it from me, to try what a little more just and solid PHILOSOPHY, join'd to a Method of CURE, and proper Medicines could do, to put a Stop to so universal a LUNACY and MADNESS."

"WHAT I pretend to have done in some Degree ... is, That I hope I have explain'd the Nature and Causes of NERVOUS DISTEMPERS (which have hitherto been reckon'd WITCHCRAFT, ENCHANTMENT, SORCERY and POSSESSION, and have been the constant Resource of Ignorance) from Principles easy, natural and intelligible. deduc'd from the best and soundest NATURAL PHILOSOPHY"

Cheyne deals lucidly with endogenous and exogenous factors in mental health, and his treatments are founded on the unexceptionable principles of fresh air, a simple wholesome diet (preferably a "milk, seed and vegetable diet") and occupational therapy such as horse-riding. One of the unusual features of the work is the detailed presentation of the author's personal case history.

Simple and effective psychotherapy was carried out at this time by most of the successful quacks who have already been mentioned. Mesmer was the soundest of these, and his "animal magnetism" was an excellent example of hypnotic suggestion. The successful treatment of "psychosomatic" disease by Mesmer appeared to vindicate Stahl's doctrine of "anima", and must be regarded as one of the first genuine systems of psychotherapy.

It was not however, until the end of the century, that there was any improvement in the management of serious mental disease. Almost simultaneously, about the year 1792, there was evidence of an enlightened and humane attitude towards the "insane". Both Chiarugi in Italy, and Pinel in France introduced important reforms in the treatment of mental disorders. Each began also the scientific study of psychotic illness, and sought for underlying pathological changes in the brain. It is interesting that Chiarugi approached the subject from a mechanistic viewpoint, and recommended the use of stimulants or sedatives in treatment, rather in the manner of Hoffmann and Brown. Pinel, on the other hand, was a pupil of Barthez, and consequently a believer in "Vitalism". Pinel's search for causative organic lesions is therefore paradoxical.

Just at this time, too, similar reforms were advocated by Andrew Duncan (Senior) in Edinburgh, and by a layman, William Tuke, in York "The Retreat" established by Tuke was to serve as a model for future reformers in this field.

Basic Medical Disciplines

During the Eighteenth Century, the steady but unspectacular advances in clinical medicine lagged behind the progress made in the basic medical sciences.

Anatomy during the previous century had been in one of its most productive phases, and was still inseparably and harmoniously united to physiology. The impetus given by such giants as Harvey, Malpighi, Sylvius, Willis and the Bartholins was still appreciable late in the Eighteenth Century. As in clinical medicine, so too in anatomy, Scots feature prominently at this time. In Edinburgh, an important school was established by the first Alexander Monro. He was a pupil of Cheselden and Boerhaave, and had been appointed Professor at the age of twenty-two. Monro's son who later inherited the chair did much to enhance Edinburgh's reputation for teaching and research in this field. Anatomical teaching in London was notable carried out by William Cheselden during the first half of the century. Later, however, the expatriate Scots, William and John Hunter, established a school which rivalled that of Edinburgh.

The British anatomists and their contemporaries on the Continent, who included Winslow, Vater, Albinus, Scarpa and the dynasty of Meckels, all advanced descriptive anatomy and produced beautiful published work. One of the less attractive features of anatomy at this time was the frequent occurrence of bitter disputes on points of priority. The Hunter brothers

were often at the centre of such controversy as, for example, that to establish priority for the first successful injection of the testicle by way of the vas deferens, or for the first demonstration of the correct origin of the "hernia congenita"

In the domain of physiology, enthusiasm was equally evident. This is particular so in the physiology of the nervous system. Thus Haller, one of Boerhaave's most distinguished pupils, developed the concept of "irritability" which Francis Glisson had suggested in the previous century.

Haller showed "That Irritability, or the Contraction arising from the application of Stimuli, is a particular Property of muscular Fibres, in like Manner as Gravity is a Property of Matter; and that it does not depend on the Nerves, and has no Connection with Sensibility." 22

He thereby paved the way for the myogenic theory of the heart-beat. In his day, also, Haller rendered physiology a great service by gathering together in a scholarly manner all existing work in the subject.

In Edinburgh, too, there were notable contributions to the study of the activity of the nervous system. Robert Whytt in the Chairs of the Practice of Medicine and the Institutes of Medicine carried out brilliant work to localize the reflex arc in the spinal cord, independant of the brain. He also demonstrated the importance of the sympathetic nervous system in involuntary movement, thus upsetting some of Stahl's hypotheses. This, and his great clinical work, for example

A
TREATISE
ON THE
E Y E,

The MANNER and PHÆNOMENA
of VISION.

IN TWO VOLUMES.

By WILLIAM PORTERFIELD, M.D.
Fellow of the Royal College of Physicians
at Edinburgh.

VOL. I.

*—Whence is it that Nature doeth nothing in vain, and whence
arises all that Order and Beauty we see in the World?—
How came the Bodies of Animals to be contriv'd with so much
Art, and for what Ends were their several Parts? Was the
Eye contriv'd without skill in Optics, and the Ear without
knowledge of Sounds? &c. NEWTON'S Opticks, Query 28.*

EDINBURGH:

Printed for A. MILLER at London, and for G. HAMIL-
TON and J. BALFOUR at Edinburgh.

M, DEC, LIX.

his studies of tuberculous meningitis, make Whytt the leading neurologist of his time, and a worthy successor to Willis.

At this time in Edinburgh, also, the strange Dr. Porterfield was carrying out work of a more theoretical and speculative nature, particularly in relation to vision. Porterfield had in 1724 been chosen as the original occupant of the Chair of the Institutes of Medicine, with the unusually binding condition that "Dr. Porterfield by his acceptation, binds and obliges himself to give colleges regularly, in order to the instructing of students in the said science of medicine."

This notwithstanding, it seems unlikely that he ever, in fact, delivered any lectures.²³ Although a reluctant teacher, Porterfield was an able anatomist and physiologist, as well as being a resourceful logician. His most important work, "A Treatise on the Eye",²⁴ is a fascinating blend of mathematics, metaphysics, anatomy and physiology. In these two volumes, published in 1759 towards the end of his life, the author fearlessly refutes, at great length, many of the pre-existing ideas on the structure and function of the eye and surrounding parts. Detailed consideration is given to each component of the eye in turn. The chapters on "the Crystalline", "The Choroides", the retina and optic nerves are particularly valuable. For example, Porterfield settles decisively the contemporary argument as to whether the choroid or retina was "the immediate Organ of Sight", He had no doubt that "The Retina ... serves

for receiving the Images of external Objects painted thereon, and to propagate the Impressions made thereby thro' the small Fibres of the optic Nerve into the common Sensory, or that Part of the Brain in which all the Fibres of our Nerves terminate, and in which our Mind resides, by which Means the Ideas of Objects are excited in the Mind."

He was, however, rather pessimistic about tracing the visual pathways in the brain to their ultimate destinations.

The Connection betwixt these Ideas and the Motions or Agitations excited in the Retina, optic Nerves and Sensorium, is unknown to us; neither need we ever expect to discover it: It is sufficient that we know, by Experience, that the Union of the Body and Mind is so strict, that some Motions in the Body do, as it were, cohere with certain Ideas in the Mind, so as they cannot be separated from each other, tho' we cannot find any thing common between them....."

The argument continues on metaphysical lines.

The author begins his final section (Book V.) with a useful synopsis of his overall plan,

"Having dispatched what we thought necessary for understanding the Fabric of the Eye, the Nature of Light, the Manner of Vision, the Use of the several Parts of the Eye, and Necessity of its different Conformations in different Animals; I shall now proceed to the last Part of the Theory of this Organ, which was, to account for the various Phaenomena of Vision. This is indeed a very curious and entertaining Subject...."

After almost 900 pages in all, the Treatise ends with a delightfully candid apology for having barely touched on the subject of the diseases of the eye.

"The Conditions required for perfect Vision are indeed very numerous, as may be gathered from what has been said above, and therefore the Diseases of the Organ, or the Want of any one or more of these Conditions, must also be very numerous. To explain these Diseases in a rational Manner, and agreeable to the Principles I have laid down, and to point out a Method of Cure

founded on Reason and Experience, is what I should now proceed to; but being heartily wearied with what I have already done, the Humour of writing will hold out no longer; and therefore I must delay this Part of my Design till some other Occasion, when I may be more at leisure, and more in the Humour of writing than I am at present, after the Fatigue I have had in compiling the above Theory."

Although it is not always easy to distinguish Porterfield's own observations from those of the numerous authorities he cites, his performance is dazzling; the neglect of this work by medical historians is very regrettable.

Later in the century, physiology received the benefit of the recent discoveries in electricity. This resulted in work such as that of Galvani and Volta on electrical stimulation of muscles, Its application to treatment as "electrotherapy" was, however, exploited by charlatans, as already described.

By devious routes, too, ideas were arising on the subject of the localization of cerebral function. One of the strangest sources was the work of Gall - the founder of "phrenology". The sound principle of careful observation of structure and its correlation with function, was applied by Gall to cranial morphology in relation to intellectual abilities. There is, of course, a parallelism here with "physiognomy", which, though less worthy of our attention, was equally popular at the end of the century - mainly due to the work of the Swiss pastor, Lavater.

Gall began as a serious student of neuro-anatomy working mainly on the tracts of the brain. His attempts to localize

the various intellectual functions in specific areas of the brain incurred the wrath of the religious and civil authorities in Austria. Because he had divided up the soul on an anatomical basis, or, as some held, denied its very existence, Gall was forced to leave the country. A greater misfortune, however, was the exploitation of phrenology by quacks, for this has seriously detracted from its historical importance. The basic concept was reasonable enough. In our own century, indeed, the sensitivity of the palpating hand has been greatly increased by electro-encephalography.

In other branches of physiology, equally important work was being carried out. The Rev. Stephen Hales' observations on the pulse and on the measurement of blood pressure require special mention, as do Spallanzani's studies on the circulation, on respiration, and on digestion. His work to disprove the theory of spontaneous generation will require further consideration.

Important advances were also made in the application of chemistry to physiology during the second half of the century. The Scottish contribution was again important, and was chiefly due to Joseph Black, a pupil of Cullen. Amongst other things, Black showed that "fixed air" (or carbon dioxide) was produced by fermentation, as well as by heating or acidifying lime. A Nonconformist minister, Joseph Priestley, next recognised the importance to animals of "dephlogisticated air" (or oxygen), and showed that plants could produce the gas from air which had been altered by combustion or respiration. It remained for

Lavoisier to determine the exact interrelationship of these gases, and to present the first correct account of respiration.

The Eighteenth Century saw, too, the firm establishment of pathology as an integral part of Medicine. This development was due principally to the work of Morgagni. With infinite care he constantly strove to correlate the anatomical findings, after death, with the clinical history. Nevertheless the frequent assertion that Morgagni was the founder of pathological anatomy ignores much important work carried out in the Seventeenth Century by Thomas Bartholin, Severino, Werfer, and others; also it takes no account of the work, at the beginning of the Eighteenth Century, by Lancisi, and Valsalva - Morgagni's own teacher.

During the second half of the century, the young science of pathological anatomy had a number of British exponents. One of these was John Hunter who undoubtedly was a pioneer in experimental pathology. Unfortunately after his death much of Hunter's work seems to have been systematically plagiarized and his notes subsequently destroyed by Everard Home. Towards the end of the century, another Scot, Matthew Baillie, made notable contributions to pathology. Baillie - Hunter's nephew may be said to have founded "special pathology" with his book "Morbid Anatomy".²⁵ In this work, the first comprehensive account of the subject, Baillie arranges his descriptions of pathological changes according to organs and systems, rather than on the basis of symptomatology, as Morgagni had done.

The other great advance in pathology occurred at the very end of the century, in France. Bichat, apparently influenced by the vitalist, Pinel, drew the attention of pathologists to tissues rather than organs as the site of disease. It is often said that Bichat, before his early death at the age of thirty-one, had rendered to pathology the same service that Malpighi had rendered to anatomy, a century earlier. It is remarkable, however, that Bichat did not use the microscope in his work. He nevertheless paved the way for the introduction of the concept of "cellular pathology" by Goodsir and Virchow in the Nineteenth Century.

In reviewing Eighteenth Century medical sciences; a major disappointment is experienced when bacteriology comes under consideration. At the beginning of the century the stage was set for a general acceptance of the "germ theory" of disease. Kircher and Lange had already postulated, in their doctrine of "contagium animatum", the transmission of disease by tiny living creatures. Leeuwenhoek had, meanwhile, been sending for a number of years, his celebrated letters to the Royal Society, containing detailed observations on the new world of "animalcules". Indeed, two centuries earlier, Fracastorius had published an extraordinarily complete treatise on contagion, which clearly described the pathways by which infectious diseases are transmitted. Despite these auspicious beginnings, bacteriology failed to make any real progress in the 150 years between the end of the Seventeenth

Century and the middle of the Nineteenth Century.

The only important experimental work was carried out in the controversy over "spontaneous generation". Joblot in 1718 had published findings which demolished this doctrine in the case of "infusoria". Nevertheless the concept was revived by Needham and Buffon about the year 1750. Spallanzani, already noted in connection with physiology, then began his superb studies to show that the "animalcules" of putrefaction, like "infusoria", would not develop from inanimate material. The elaborate precautions which Spallanzani took, to ensure the sterility of his materials and their freedom from subsequent contamination, were unfortunately neglected by his opponents, and the dispute dragged on for many years. It even persisted into our own century, due to the efforts of a distinguished Fellow of the Royal Society - Charlton Bastian.

Although the studies on fermentation of Cagnard-Latour, Schwann, and especially Pasteur were to form the foundation of modern bacteriology, the Eighteenth Century workers - notably Boerhaave, Black and Lavoisier - stressed purely chemical aspects.

The remaining items of strictly bacteriological interest in the Eighteenth Century were of a speculative nature. The most remarkable of these is found in the work of Benjamin Marten - an obscure English physician. His book, "A New Theory of Consumptions", published in 1720,²⁶ contains astonishingly accurate accounts of the aetiology and pathogenesis of pulmonary

A
NEW THEORY
OF
Consumptions:
More especially of a
P H T H I S I S,
OR
Consumption of the Lungs.

WHEREIN,
After a brief History of the *Distemper*, its various
Symptoms throughout its several Degrees, and every mi-
nute Step it takes, from its first invading the Patient, to
its final Termination,

Enquiry is made
Concerning the Prime, Essential, and hitherto ac-
counted Inexplicable CAUSE of that Disease, so very Ende-
mick to this Nation, and generally fatal to those it seizes on.

With an Account
Of the great Number of Medicines, and various Me-
thods of CURE recommended for Consumptions; and the
different Opinions of Authors concerning them.

ALSO
The Possibility of Healing Ulcers in the Lungs asserted,
the strongest Objections against it answered, and a different
and more probable Method of CURE advanced, than
commonly practised.

LIKEWISE
Directions about Eating, Drinking, Sleeping, Exer-
cise, and way of Living in general, proper for Con-
sumptive Persons.

By BENJAMIN MARTEN, M. D.

LONDON, Printed for R. Knaplock, at the Bishop's Head
in St. Paul's Church-yard; A. Bell, at the Cross Keys and Bible
in Cornhill; J. Hooke, at the Flower de Luze against St. Dun-
stan's Church in Fleetstreet, and C. King, at the Judge's
Head in Westminster-Hall. MDCCXX.

(Price 3 s. 6 d.)

Chap. II. of Consumptions. 51

us in our Enquiries, give us some light into it, and warrant the following Attempt.

The *Original and Essential Cause* then, which some content themselves to call a vicious Disposition of the Juices, others a salt Acrimony, others a strange Ferment, others a malignant Humour (all which seem to me dark and unintelligible) may possibly be some certain Species of *Animalcula* or wonderfully minute living Creatures, that, by their peculiar Shape, or disagreeable Parts, are inimicable to our Natures, but however capable of subsisting in our Juices and Vessels, and which being drove to the Lungs by the Circulation of the Blood, or else generated there from their proper Ova or Eggs, with which the Juices may abound, or which possibly being carried about by the Air, may be immediately convey'd to the Lungs by that we draw in, and being there deposited, as in a proper *Nidus* or Nest, and being produced into Life, coming to Perfection, or increasing in Numbers, may, by their spontaneous Motion, and injurious Parts, stimulating, and perhaps wounding or gnawing the tender Vessels of the Lungs, cause all the Disorders that have been mentioned, viz. a more than ordinary Afflux of Humours upon the Part, Obstruction, Inflammation, Exulceration, and all other

tuberculosis. Marten proposed that consumption is caused by

"Some certain Species of Animalcula or wonderfully minute living Creatures, that, by their peculiar Shape, or disagreeable Parts, are inimicable to our Nature; but however capable of subsisting in our Juices and Vessels, and which being drove to the Lungs by the Circulation of the Blood, or ... which possibly being carried about by the Air, may be immediately convey'd to the Lungs by that we draw in, and being there deposited, as in a proper Nidus or Nest, and being produced into Life, coming to Perfection, or increasing in Bigness, may by their spontaneous Motion, and injurious Parts, stimulating, and perhaps wounding or gnawing the tender Vessels of the Lungs, cause all the Disorders that have been mentioned viz. a more than ordinary Atflux of Humours upon the Part, Obstruction, Inflammation, Exulceration, and all other Phaenomena and deplorable Symptoms of this Disease."

Marten also considered, congenital routes of infection, speculating that "Many Species of Animalcula ... may have been communicated to us, or convey'd into our Fluids with the Nourishment we receiv'd through the Umbilical Vessels, even whilst we were in the Womb".

He dealt, too, with the specificity of these "Animalcules" in such varied diseases as "Plague, Pestilential and other Fevers, Small Pox, Measles ..."

The importance of the infecting dose was stressed, for, on the one hand "by an habitual lying in the same Bed with a Consumptive Patient constantly Eating and Drinking with him, or by very frequently conversing so nearly, as to draw in part of the Breath he emits from his Lungs, a Consumption may be caught by a sound Person" whereas, "there being but few if any of those minute living Creatures or their Eggs communicated in slender Conversations, and which, if they are, may not perhaps be produced into Life, or be nourished or increased, in the new Station they happen to be cast; besides, we may imagine that some Persons are of such an happy Constitution, that if any of the Ova of the inimicable minute Animals that cause a Consumption, happen to get into their Bodies, they may likewise be quickly forc'd out again.

Reverting to the question of pre-existing disease in the

aetiology of consumption, Marten suggested that some of the "minute animals" may produce "Fore-running or predisposing Diseases, (so that) the Juices of the Body are impoverish'd, and Lungs impair'd, that Viscus also, may give way to the Fury of these inimicable and very minute Creatures".

Marten was equally sound on the principles of treatment.

The main consideration should be "destroying such Animalcula.... without Difficulty or Inconvenience to the Patient, yet their pernicious Effects could not be suppos'd to be thereby so immediately cured, any more than the destroying a Dog that had bit a Man, could be suppos'd to cure the Wound he had made with his Teeth.

Tho' indeed the Original Cause being once intirely destroy'd, and thereby prevented from continually propagating mischievous Effects, there will then little more remain to be done, besides assisting Nature (who is always very kind and laborious for the Good of the Machine) in healing the Breaches and repairing the Damages she has before sustained."

The particular "magic bullets" required by his hypothesis were, however, not to be available for a further 230 years, and Marten had therefore to content himself with supportive measures and a gentle "Method of Evacuation", so that "those Animalcula may be cast forth of our Bodies".

Marten's views, unfortunately, seem to have had no influence in his day. Forty years later, similar - though less brilliant - conjectures were published by Plenciz in Vienna. The quack Katterfelto, too, had unusually advanced views on the nature of "contagion". Of his popular demonstrations, in 1782, the newspapers reported that "physicians and mathematicians express great satisfaction of the Solar Microscope demonstrating insects ... seen as large as birds - which caused the late influenza." And again, "A noted philosopher, has observed and discovered by the Solar Microscope, that at present

the air is infected with a great variety of different insects; and much of the same kind by all accounts which were so numerous in the air in Italy in the year 1423, the time of the Plague."²⁷

Katterfelto was one of the first to alarm the public with stories about "germs", and of course the "noted philosopher" had an infallible cure for influenza. The service that Linnaeus had performed for the higher plants was not extended to the more humble ones. In his Systema Natura,²⁸ the tiny creatures of the early microscopists were arranged under VERMES in the Class "Chaos". Apart from "Chaos infusorium" we find "Febrium exanthematicarum contagium?"

Febrium exacerbantium causa? Siphilitidis virus humidum?
Spermatici vermiculi Leuwenh.? Aethereus nimbus mense
florescentiae suspensus? Fermenti putredinisque septicum Munch.?"

Although some of these guesses are impressive, the bacteriologist cannot readily forgive the inclusion of spermatozoa and "the aery mist floating in the month of blossoming".

A more acceptable attempt at bacterial classification was made on a morphological basis by the Dane, Otto Müller. His works, published between 1773 and 1786, are, however, concerned mainly with free-living marine and fresh-water micro-organisms. Müller's work was aided by improvements in microscopy. Thus, Lieberkühn had, in 1739, perfected Leeuwenhoek's solar microscope; and about this time, too, achromatic lenses were invented by Hall and Dollond, working independently. A further advance in the study of bacteria came in 1778 with the introduction

of simple staining procedures by Von Gleichen.

The Birth of Preventive Medicine

A major achievement of Eighteenth-Century Medicine, and one which is generally overlooked, was the rise of the group of sciences that together constitute "Preventive Medicine". In

the words of Sir George Newman, "quite apart from their contribution to culture and literature, to therapeutics and to surgery, (the Eighteenth-Century practitioners) moved English Medicine forward in eight preventive directions:-

1. They explored the circumstances of epidemic disease, and observed the causative relation of external environment to it, including the effect of climate.
2. They introduced the principles of medical notification, of isolation, and of fumigation and disinfection, though their disinfectants were probably not germicidal.
3. They advocated an improved and enlarged dietary, combined with restriction of spirit-drinking. Tea, coffee, vegetables, and fruit were warmly recommended by them.
4. They initiated industrial welfare, and were the prime movers in the health and sanitary control of the factory system.
5. They began the reformation of midwifery, first by undertaking the practice of midwifery themselves, and secondly by improving the methods of delivery and the care of the lying-in women.
6. They first attacked systematically the problem of infant mortality.
7. They lent their support and service to the establishment of dispensaries, hospitals and medical schools.
8. They laid the early foundation of immunity. 29

Some of Newman's items are questionable, but his first category encompasses much important and neglected material.

The first major work on non-communicable epidemic disease was Ramazzini's treatise "On the Diseases of Artificers", published in 1700.³⁰ The progress of British "Industrial Medicine" may be traced from the appearance, in 1746 of the English translation

by Robert James, who has already been mentioned as an opponent of polypharmacy. Ramazzini discusses a remarkably comprehensive range of occupational diseases. An important addition to the list was made by Percivall Pott, when, in 1775, he described carcinoma of the scrotum in chimney-sweeps. This was probably also the first description of a carcinogen.

Another important contribution in this field was made by a distinguished Edinburgh graduate, James Lind. In 1753 and 1757, Lind published works describing the prevention and cure of Scurvy in sailors by means of fruit juice. After some delay, the British Navy applied these findings, and abolished the principal occupational disease of sailors.

The epidemiology of infectious disease took some time to recover from the influence of "The English Hippocrates", Thomas Sydenham. Though an admirable clinician, Sydenham's emphasis upon "epidemic constitution", "ebullition", "commotion of the blood" and "effluvia from some mineral fermentation", was influential, for two centuries, in retarding the acceptance of the doctrine of Contagion and its corollary, the Germ Theory.

Benjamin Marten was not alone in finding the mediaeval concepts of Sydenham "dark and unintelligible". In the same year as Marten's book there was published "A Discourse on the Plague" by Richard Mead. A pupil of Archibald Pitcairne, and one of the most successful physicians of his day, Mead reaffirmed The doctrine of Contagion with great clarity. Mead's "Discourse" went through a number of editions which show the gradual development of his

ideas.³¹ He realised, that a factor other than contagion must also be present before an epidemic could occur, but held that this factor was "A corrupted State of the Air". We believe that it is the result of a concentration of rats and fleas, in the case of plague, and increased virulence of the pathogen or increased susceptibility of the host population, or both, in other epidemic diseases. Although he did not consider "animate" contagion, and therefore his ideas sound rather old-fashioned in comparison to those of Marten, Mead's lucid writings on the plague, and on smallpox and measles, gain him an important position in the history of epidemiology.

The science was further developed by a number of men who are now almost entirely forgotten. The first of these was Sir John Pringle - one of the most remarkable men of his time. He studied in Edinburgh, St. Andrews and Leyden, where he had the benefit of Boerhaave's instruction. On his return to Edinburgh, Pringle engaged in the practice of physic, but at the age of twenty-six he was nevertheless, appointed Professor of Pneumatical and Ethical Philosophy. He continued in his dual capacity as physician and moral philosopher for a further eight years, when he became physician to the British Army. Soon rising to the position of Physician-General, he retained his University Chair for a further three years - despite his continued absence from Edinburgh.

Much of Pringle's important work was carried out during his Army period. He reorganised medical services, setting an

John Pringle M.D. Edin.

OBSERVATIONS

ON THE

Diseases of the Army.

BY

JOHN PRINGLE, M.D.

Physician in Ordinary to Her MAJESTY.

THE FOURTH EDITION enlarged.



EX SIMPLICITATE DECUS.

L O N D O N :

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near St. Martin's Church. MDCCLXIV.

example for Lind to follow in the case of the Royal Navy. Among his many achievements, Pringle arranged for military hospitals to be regarded as neutral territory, thus foreshadowing the Geneva Convention by 120 years. In the present context, however, Pringle's improvements in the physical condition of military hospitals are of more importance. His labours are embodied in "Observations on the Diseases of the Army", first published in 1752.³²

In his preface, Pringle asserts, "Among the chief causes of sickness and death in an army, the Reader will little expect that I should rank, what is intended for its health and preservation, the Hospitals themselves; and that on account of the bad air, and other inconveniences attending them."

"Of the diseases most incident to an Army" Pringle is particularly concerned with "such as proceed from foul air and contagion. The most fatal are the dysentery and hospital-fever, which tho' arising from other causes, spread most by infection."

He also considers smallpox, measles, lues venerea and "the itch" as contagious diseases.

The most valuable sections of the book deal with the aetiology and prevention of dysentery and hospital-fever.

"In camp, the contagion (of dysentery) passes from one, who is ill, to his companions in the same tent; and from thence perhaps to the next. The foul straw becomes very infectious. But the great source of infection are the privies, after they have received the dysenteric excrements from those who first fall ill. The hospitals likewise spread it: for those that are admitted with the flux, not only give it to the rest of the patients, but to the nurses and other attendants of the sick

But of what nature is this infection? In the former editions of this work, I considered the spreading of the distemper as owing to putrid exhalations from the humours of those who fall first ill of it; and that when this miasma is received into the blood, I conceived

it to act upon the whole mass as a ferment, disposing it to putrefaction..... But having since perused the curious dissertation, published by Linnaeus, in favour of Kircher's system of contagion by animalcula, it seems reasonable to suspend all hypotheses, till that matter is further inquired into."

Pringle's instructions for preventing the spread of dysentery are sound. "Whenever the bloody flux begins to spread, the best means of preservation are to leave the ground, with the privies, foul straw, and other filth of the camp behind: which method is to be repeated once or twice more, or oftner, if consistent with the military operations

In order to preserve a purity of air in the dysenteric season, let there be some slight penalty, but strictly inflicted, upon every man that shall ease himself anywhere about the camp, but on the privies.

Lastly, when the disease begins to be frequent, the sick should not be sent to one common hospital; at least not in such numbers as to vitiate the air, so as not only to communicate the infection to others, but to keep it up among themselves."

The sick should be dispersed in "spacious and airy barns, granaries and the like places ... without this dispersion of the sick, the general hospital may, in bad seasons, be charged with some thousands; who cannot be well attended, but by a much greater number of hands, than has ever been allowed by the public. But, were that objection removed, it would be still unadvisable to have but one common hospital, on account of the mortality that naturally ensues, upon crowding together such a number of men ill of so putrid a disease".

Chapter VII on hospital-fever is an expansion of a letter Pringle had written to Mead in 1750 "on the Jail, or Hospital-fever". In it he had pointed out, for the first time, that the Jail and Hospital fevers were identical diseases (typhus). As in the case of dysentery, Pringle, in the fourth edition of his book, is gradually coming to regard the contagion of hospital-fever as an animate entity. He also has interesting views on the effect of lowered host resistance, thus "all septic particles,

passing into the blood, become more active and fatal if the infected person catches cold, or by any accident suffers a stoppage of perspiration; for a free perspiration is the chief means by which the blood is freed from any infectious matter."

In his "observations on the Itch", Pringle has no doubt about the role of animate contagion. "The infection is communicated only by the contact of the diseas'd person, of his cloaths, bedding, &c. It is confined to the skin, and seems best accounted for by Leeuwenhoeck, from certain small insects he discovered in the pustules by the microscope. So that the frequency of the itch in the army is not to be ascribed to the change of air, or diet, that soldiers are exposed to upon expeditions, but to the infection propagated by a few (who happen to have it at first setting out) to others in the same ship, tent, or barrack. But of all the places the hospitals are most liable to the contagion, as receiving all sorts of patients. Hence I have observed, that after the crisis of fevers, the itch generally appeared, tho' the person was free from it when admitted."

Pringle's general recommendation for preventing hospital cross-infection are unexceptionable: "As to the disposition of hospitals, with regard to preserving the purity of the air, the best rule is, to admit so few patients into each ward, that a person unacquainted with the danger of bad air, might imagine there was room to take in double or triple the number. It will also be found a good expedient, when the cielings are low, to remove some part of them, and to open the garret story to the tiles. It is surprizing in how few days the air will be corrupted in close and crouded wards; and, what makes it hard to remedy the evil, is the difficulty of convincing either the nurses or the sick themselves, of the necessity of opening the doors or windows at any time for air. I have generally found those wards the most healthful, when by broken windows, and other wants of repair, the air could not be excluded.

It is therefore probable, that when fireplaces are wanting, the greatest preservative would be found in the use of the reverend Dr. Hales's ventilators

Another point to be observed in a fixed camp, is to have the regimental hospitals scattered, and not crouded into one village. And for the same reason, if the general hospital should be obliged to admit a great number at a

time ... it will be proper to have the sick dispersed into two or three villages, rather than kept in one; tho' a narrower compass may be more for the oeconomy of the hospital, and the easier attendance of the sick."

It seems likely that Sir James Y. Simpson found inspiration here for his notable work against "hospitalism" which began nearly a hundred years later.

Another very interesting feature of Pringle's book is the Appendix containing his "Experiments on Septic and Antiseptic Substances; with Remarks relating to their use in the Theory of Medicine; in several Papers, read at the Royal Society." In these papers, the term "antiseptic" appears for the first time. As a result of his experiments, Pringle was awarded the Copley gold medal of the Royal Society, and later he was elected the Society's President.

Pringle's general intellectual attainments were astonishing; apart from his distinction in Medicine, Moral Philosophy and the natural sciences, he was, for example, an accomplished musician, philologist and theologian. Benjamin Hutchinson,³ however, regretted that "SIR JOHN PRINGLE had not much fondness for poetry. He had not even any distinguished relish for the immortal Shakespeare; at least, he seemed too highly sensible of the defects of that illustrious bard, to give him the proper degree of estimation." And, to make matters worse, "he was fond of Voltaire's critical writings."

The pioneer work of Pringle in combating hospital cross-infection was continued by his military successor, Richard Brocklesby. The standard works on the history of Medicine do not even mention Brocklesby, and yet his "Oeconomical and Medical

Observations",³⁷ published in 1764, forms an excellent sequel to Pringle's "Observations". In his book, Brocklesby acknowledges his debt to "Dr. Pringle". There follows a particularly trenchant statement on the condition of hospitals, which with slight modifications is still relevant.

"Infirmaries, or hospitals, in all countries, are for the most part unclean and infectious places, and tho' every precaution is taken to purify them, such as washing with vinegar, burning brimstone, gunpowder, or resinous substances, scouring the boards, and such like; yet a perfectly safe purification, in some cases, can never be fully effected the seeds of infection once sown, continue, in some instances, to spread contagious diseases, and to contaminate the house, as much as ever the walls of the Israelites were infected with the filthy leprosy, which is said to have germinated from the walls of their tents or hutts"

Brocklesby gives good descriptions of epidemics of "malignant sore throat" and the "dangerous putrid fever" in military hospitals. He also describes the spread of "spotted fever" in a smallpox hospital.

Brocklesby successfully prevented further outbreaks by housing the sick in well-ventilated temporary "hutts" which were destroyed after being in use for a limited period.

An important service was also rendered to the army by Francis Home - another pupil of Boerhaave. Home, who was to become the first occupant of the Chair of Materia Medica at Edinburgh, had the remarkable idea of causing all drinking water to be boiled before use by the dragoons serving in Flanders. Home also seems to have been the first to describe diphtheria as a distinct clinical entity.³⁸

Notable contributions to epidemiology were also made by John Fothergill, who graduated in Medicine at Edinburgh in 1736. His work included "An Account of the putrid sore throat attended with ulcers (1748)" which described a remarkable epidemic apparently of severe scarlet fever. Another interesting work is his "Weather and disease".

Towards the end of the century the most important epidemiological work was concerned with puerperal fever. Francis Home, and Thomas Young, who was appointed Professor of Midwifery at Edinburgh in 1756, appear to have been among the first to consider puerperal fever as an infectious disease.³⁷ William Hamilton, who was to succeed Young in 1780, expressed this revolutionary concept very concisely:

"In hospital practice there is no doubt but that the disease is produced by specific contagion from the air of the wards. It is particularly observed in surgical wards that there is such a state of the air sometimes as produces almost in every wound, even the slightest symptoms of erysipelas and even mortification. In the Edinburgh Infirmary, when such a state of the air was present puerperal fever raged violently, but at no other time."³⁸

This observation on the relationship between surgical erysipelas and puerperal fever is especially noteworthy, and has been fully confirmed by modern bacteriology.

Undoubtedly, however, the most important contribution to the epidemiology of puerperal fever was made by Alexander Gordon, who graduated at Aberdeen after studying at Edinburgh. In his "Treatise on the Epidemic Puerperal Fever of Aberdeen",³⁹ Gordon shows that the infection was most commonly introduced by the attendants directly, rather than by the indirect agency of the

air. He dismissed entirely Sydenham's concept of "epidemic constitution" of the environment:

"That the cause of the epidemic puerperal fever under consideration was not owing to a noxious constitution of the atmosphere, I had sufficient evidence; for, if it had been owing to that cause, it would have seized women in a more promiscuous and indiscriminate manner. But this disease seized such women only as were visited or delivered by a practitioner or taken care of by a nurse, who had previously attended patients affected with the disease.

In short, I had evident proofs of its infectious nature, and that the infection was as readily communicated as that of smallpox or measles and operated more speedily than any other infection with which I am acquainted.

With respect to the physical qualities of the infection I had evident proofs that every person who had been with a patient in the puerperal fever, became charged with an atmosphere of infection, which was communicated to every pregnant woman who happened to come within its sphere. This is not an assertion, but a fact, admitting of demonstration, as may be seen by a perusal of the foregoing table."

The table, rather unwisely, gives the names of the midwives and patients attended, and the outcome of the individual cases. The ~~is~~table ~~to~~ shows in great detail the manner in which the infection was transmitted. When the disease occurred in the surrounding countryside ^{Gordon} ~~he~~_λ was able to trace it to infected midwives who had travelled from Aberdeen.

On prevention of the disease Gordon admits "I must speak with great uncertainty, because in this matter I have not experience for my guide

Whether the infection of the puerperal fever is capable of being destroyed by the same means as that of other fevers, I cannot confirm with certainty but think it very probably and that they ought to be tried.

That fresh air and cleanliness are insufficient for the destruction of contagion and that there is no certain antidote but fire and smoke has been demonstrated by the ingenious Dr. Lind. This excellent author has proved

that fire and smoke are the most powerful agents for annihilating infection; and, as he thinks, even the plague itself.

The methods which he recommends for the purification of infected chambers and for the fumigation of infected apparel may be seen by perusing his ingenious papers on fevers and infections to which I refer the reader.

The same means ought to be practised for preventing the infection of puerperal fever. The patient's apparel and bedclothes ought to be burnt or thoroughly purified; and the nurses and physicians who have attended patients affected with the puerperal fever, ought carefully to wash themselves and to get their apparel properly fumigated before it be put on again."

Near the end of his "Treatise", Gordon gives more details of the manner in which some patients receive the infection: "that putrid matter is capable of producing an inflammatory disease is a position which perhaps will be questioned by many readers. Be that as it will, its truth is proved both by dissection and inoculation for the smallpox; for if the matter be taken from the most malignant smallpox and applied to the arm of a person who never had the disease; it produced inflammation in the part to which it is applied and afterwards (provided the patient has been properly prepared) a distinct smallpox of the mildest kind.

And if in the dissection of a putrid body a surgeon scratch his finger, the part festers, that is inflames and suppurates; and if a fever should be the consequence it is inflammatory in the beginning and only ultimately putrid

In like manner, if putrid matter be applied to the uterus it inflames that organ and the contiguous viscera; that is, it gives rise to puerperal fever, which is ushered in with a cold stage, and succeeded by a very rapid pulse and acute pain in the abdomen."

Because of his scrupulous honesty, Gordon suffered a fate which foreshadowed that of Semmelweis by more than fifty years.

The last extract from Gordon's "Treatise" shows a grasp of the simple principles of immunity. The foundations of immunology were laid early in the century, following the introduction

of the Oriental practice of "inoculation" (or "variolation") against smallpox. Lady Mary Wortley Montagu, who did much to popularize the procedure, gives an excellent description of it in one of her entertaining letters from Turkey, in 1717.

"The small-pox, so fatal and so general amongst us, is here entirely harmless by the invention of ingrafting, which is the term they give it. There is a set of old women who make it their business to perform the operation every autumn, in the month of September, when the great heat is abated. People send to one another to know if any of their family has a mind to have the small-pox: they make parties for this purpose, and when they are met (commonly fifteen or sixteen together), the old woman comes with a nut-shell full of the matter of the best sort of small-pox, and asks what vein you please to have opened. She immediately rips open that you offer to her with a large needle (which gives you no more pain than a common scratch), and puts into the vein as much matter as can lie upon the head of her needle, and after that binds up the little wound with a hollow bit of shell; and in this manner opens four or five veins The children or young patients play together all the rest of the day, and are in perfect health to the eighth. Then the fever begins to seize them, and they keep their beds two days, very seldom three. They have very rarely above twenty or thirty in their faces, which never mark; and in eight days' time they are as well as before their illness. Where they are wounded, there remain running sores during the distemper, which I don't doubt is a great relief to it. Every year thousands undergo this operation; and the French ambassador says pleasantly, that they take the small-pox here by way of diversion, as they take the waters in other countries. There is no example of anyone that has died in it; and you may believe I am well satisfied of the safety of this experiment; since I intend to try it on my dear little son.

I am patriot enough to take pains to bring this useful invention into fashion in England; and I should not fail to write to some of our doctors very particularly about it, if I knew any one of them that I thought had virtue enough to destroy such a considerable branch of their revenue for the good of mankind. But that distemper is too beneficial to them not to expose to all their resentment the hardy wight that should undertake to put an end to it. Perhaps, if I live to return, I may, however, have courage to war with them"
40 39

Apart from the occasional severity of the illness induced, a drawback of the method is indicated later in her correspondence:

"The boy (her son) was ingrafted last Tuesday, and is at this time singing and playing very impatient for his supper. I pray God my next may give as good an account of him. I cannot ingraft the girl, her nurse has not had the small-pox"

Despite these disadvantages, and Lady Montagu's prognostications (which once again indicate the popular "image" of the Profession at that time), inoculation rapidly flourished in Britain. Indeed, at the end of the century it served as a hindrance to the introduction of vaccination.

The story of the discovery of vaccination by John Hunter's pupil, Edward Jenner, is well-known. Jenner's little book "An Inquiry into the Causes and Effects of the Variolae Vaccinae" (1798), ⁴⁰ is, however, a beautiful example of concise scientific writing; reading it again is a rewarding experience.

The emergence of complete systems of public health legislation, at the end of the century, was largely due to Johann Frank and Jeremy Bentham. Frank, working in Germany, Italy and Austria, drew extensively on epidemiology and physiology to synthesize his vast "System einer vollständigen medicinischen Polizey".

An equivalent service was rendered in Britain by the legalist, Jeremy Bentham. His "utilitarian" philosophy was based firmly in the Seventeenth and Eighteenth Centuries, being derived from Hutcheson and Priestley, and ultimately from Locke. Bentham argued persuasively for public health legislation, to promote - in Priestley's phrase - "The greatest happiness of the greatest



number"; he thus paved the way for the far-reaching Nineteenth - Century reforms in this field.

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On reviewing the entire field of Eighteenth - Century Medicine, one of the most striking features is the dominant part played by the Edinburgh teachers and the men they trained. In the basic sciences, they included Alexander Monro, Primus and Secundus, Whytt, Porterfield and Black; whilst in medical philosophy and clinical science, Sibbald and Pitcairne were succeeded by such men as Home, Pringle, Fothergill, Cheyne, Cullen, Brown, Gregory, Lind, Duncan, Withering and Darwin. The expatriate Scots, Smellie, William and John Hunter, and Matthew Baillie also made notable contributions. These, and the other giants who have been fleetingly recalled "laid the foundations upon which the Nineteenth Century built its brilliant superstructure..... They laboured as individuals with relatively little interrelationship or co-ordination. They often worked in the dark, and almost always inductively. It is only now that, looking back, we can weave their individual labours into terms of principle and collective advancement. They builded better than they knew."⁴⁷

REFERENCES

1. JAMESON, E. The Natural History of Quackery.
London: Michael Joseph, 1961.
2. LEAKE, J. Practical Observations towards the Prevention and Cure of Chronic Diseases peculiar to Women ... for The Use of those affected with such Diseases, as well as The Medical Reader. Seventh Edition
London: Printed for Evans, Paternoster-Row; Murray, Fleet-Street; and Egerton, Charing-Cross, 1792.
3. TOURNEFORT, J. The Compleat Herbal: or, the Botanical Institutions ... Carefully translated from the original Latin. London: Printed for R. Bonwicke, Tim Goodwin, John Walthoe, S. Wotton, Sam. Menship, Rich Wilkin, Benj. Tooke, Ralph Smith and Tho. Ward; and are to be sold by J. Morphew near Stationers-Hall, 1719.
4. FULLER, T. Pharmacopoeia Extemporanea: or, a Body of Medicines containing a Thousand Select Prescripts, answering most intentions of Cure ... for the Assistance of Young Physicians. Fourth Edition,
London: Printed for W. Innys, at the West End of St. Paul's Church-yard, 1730.

5. BROCKBANK, W. Sovereign Remedies: a critical depreciation of the 17th century London Pharmacopoeia.
Med. Hist., 1964, 8, 1 - 14
6. CULPEPPER, N. The English Physician Enlarged
London: Printed for S. Ballard, R. Ware,
S. Birt, C. Hitch, J. Hodges, J. Wood and
C. Woodward, 1741.
7. JAMES, R. Pharmacopoeia Universalis: or a New Universal English Dispensatory Third Edition,
London: Printed for T. Osborne, W. Strahan,
J. Rivington, R. Baldwin, L. Hawes, W. Clarke
and R. Collins, W. Johnston, T. Caslon,
S. Crowder, B. Law, Z. Stuart, and B. Collins,
1764.
8. WITHERING, W. An Account of the Foxglove and Some of its Medical Uses, Birmingham: Swinney, 1785
9. GUTHRIE, D. A History of Medicine. Revised Edition with
Supplement, Chapter XII, London and Edinburgh:
Thomas Nelson and Sons Ltd., 1960.
10. WATSON, Boog. Patrick Heron Watson,
Proc. Scot. Soc. Hist. Med., In the press.
11. BENNETT, J. Hughes. The Restorative Treatment of Pneumonia.
Edinburgh; Adam and Charles Black, 1865.
12. HAHNEMANN, S. Organon of the Rational Art of Healing.
(Everyman's Library), London: J.M. Dent &
Son Ltd., 1913.

- 13 DARWIN, E. The Botanic Garden, A Poem, in two parts.
Third Edition, London: Printed for J. Johnson,
St. Paul's Church-yard, 1795.

14. The Anti-Jacobin, in Poetry of the Anti-Jacobin
Second Edition, considerably enlarged. With six
etchings by the famous caricaturist James Gillray.
pp. 118-49. London: G. Willis, Great Piazza,
Covent Garden, 1854.

15. DARWIN, E. Zoonomia; or, The Laws of Organic Life. In
four volumes. Third Edition, corrected.
London: Printed for J. Johnson, in St. Paul's
Church-yard, 1801.

16. GRANT, A. The Story of the University of Edinburgh during
its first three hundred years. In two volumes,
London: Longmans, Green, and Co., 1884.

17. CULLEN, W. Synopsis Nosologiae Methodicae Editio Tertia,
emendata et plurimum aucta, Duobus Tomis.
Edinburgh: Prostant venales, apud Gulielmum Creech;
et Londini, apud Thomam Cadell, et Joannem Murray,
Bibliopolas, 1780.

18. GREGORY, G. Elements of the Theory and Practice of Medicine;
designed for the use of Students and junior
practitioners. Fourth Edition, revised, altered
and enlarged. London: Baldwin and Cradock,
Paternaster Row, 1835.

19. ALLEN, J. Synopsis Universae Medicinae Practicae: Sive
Doctissimorum Virorum de Morbis eorumque Causis
ac Remediis Judicia ... Editio tertia prioribus,
triente plus, auctior. Londini: Impensis W.
Innys ad Insignia Principis in Coemeterio Divi
Pauli, 1729.

20. DAVIDSON, P.B. William Heberden, M.D., F.R.S.,
Ann. Med. Hist., 1922, 4, 336-346.

21. CHEYNE, G. The English Malady: or a Treatise of Nervous
Diseases of all kinds, as Spleen, Vapours,
Lowness of Spirits, Hypochondriacal and Hysterical
Distempers, &c. In three Parts London:
Printed for G. Straham in Cornhill, and J. Leake
at Bath, 1733.

22. HALLER, A. von. in, Porterfield, W., Loc. cit, Volume II, p. 162.

23. GRANT, A. Loc. cit; Volume I, P. 307.

24. PORTERFIELD, W. A Treatise on the Eye, the Manner and Phaenomena of Vision. In two volumes, Edinburgh: Printed for A. Miller at London, and for G. Hamilton and J. Balfour at Edinburgh, 1759.

25. BAILLIE, M. The Morbid Anatomy of Some of the most important parts of the Human Body. Second Edition (corrected and considerably enlarged), London: Printed for J. Johnson, St. Paul's Churchyard, and G. Nicol, Pall Mall, 1797.

26. MARTEN, B. A New Theory of Consumptions: more especially of a Phthisis or Consumption of the Lungs London: Printed for R. Knaplock, at the Bishop's Head in St. Pauls church-yard; A. Bell, at the Cross Keys and Bible in Cornhill; J. Hooke, at the Flower de Luce against St. Dunstan's Church in Fleet Street, and C. King, at the Judge's Head in Westminster-Hall, 1720.

27. JAMESON, E. Loc. cit. pp. 63-4.

28. LINNÉ, C. Systema Natura per Regna Tria Naturae, Ed. xii. reformata, tom 1. pars 2, p. 1326. Holmiae, 1767.

29. NEWMAN, G. Interpreters of Nature p. 148, London: Faber & Gwyer, 1927.

30. RAMAZZINI, B. On the Diseases of Artificers, which by their particular callings they are most liable to. With the method of avoiding them, and their cure."
Translated and enlarged, with an appendix, by R. James, M.D., Second Edition. London; Printed for John Whiston, at Mr. Boyle's Head, and John Woodyer, at Caesar's Head, both in Fleetstreet, 1750.

31. WINSLOW, C.E.A. The Conquest of Epidemic Disease: A Chapter in the History of Ideas. pp. 178-92 Princeton, New Jersey: Princeton University Press, 1943.

32. PRINGLE, J. Observations on the Diseases of the Army, in Camp and Garrison. In three Parts London: Printed for A. Millar, and D. Wilson, both in the strand; and T. Payne, next the Mews-gate, near S. Martin's Church, 1752. (The extracts quoted are from The Preface, and Parts II and III of "The Fourth Edition enlarged." 1764.)

33. HUTCHINSON, B. Biographia Medica; or, Historical and Critical Memoirs of the Lives and Writings of the Most eminent medical Characters that have existed from the earliest Account of Time to the present period ... In two volumes, Vol II, pp. 319-20, London: Printed for J. Johnson, No 72, St. Paul's Church-yard, 1799.
34. BROCKLESBY, R. Oeconomical and Medical Observations in two Parts. From the Year 1758 to the Year 1763, inclusive. Tending to the Improvement of military Hospitals, and to the Cure of Camp Diseases, Incident to Soldiers (With Appendix). Part I pp 53-91, London: T. Becket & P.A. Hondt, 1764.
35. HUME, E.E. Francis Home, M.D., 1719-1813, The Scottish Military Surgeon who first described Diphtheria^a as a Clinical Entity. Bull. Hist. Med., 1942, 11, 48-68.
36. THOMAS, R. The Modern Practice of Physic, exhibiting the Characters, Causes, Symptoms, Prognostics, Morbid Appearances, and Improved Method of Treating the Diseases of all Climates. Sixth Edition, London: Printed for Longman, Hurst, Rees, Orme, and Brown; Cadell and Davies; S. Highley and Son; J. Callow; E. Cox and Son; Baldwin, Cradock, and Joy; T. and G. Underwood; Anderson and Chase; B. and W.B. Whittaker; and Adam Black, Edinburgh, 1819.
37. HAMILTON, A. quoted in SPENCER, H.R., The History of British Midwifery from 1650 to 1800. pp. 97-8, London: John Bale, Sons & Daniel & Son, Ltd., 1927.
38. GORDON, A. A Treatise on the Epidemic Puerperal Fever of Aberdeen. London: G.G. and J. Robinson, 1795.
39. MONTAGU, M.W. Works, including Correspondence, Poems, and Essays. (1709-60), pp. 11, 165-6, London: Printed for the Proprietors, by J.F. Dove, 1825.
40. JENNER, E. An Inquiry into the Causes and Effects of the Variolae Vaccinae, a Disease discovered in some of the Western Counties of England, particularly Gloucestershire, and known by the name of "Cow Pox". London: Printed for the Author by Sampson Low, No. 7 Berwick Street, Soho, 1798.
41. NEWMAN, G. Loc. cit.

General Works Consulted

BULLOCH, W. The History of Bacteriology. London: Oxford University Press, 1938.

CASTIGLIONI, A. A History of Medicine, Second Edition, New York: Alfred A. Knopf, 1947.

COMRIE, J.D. History of Scottish Medicine, two volumes, London: The Wellcome Historical Medical Museum, 1932.

SINGER, C., and UNDERWOOD, E.A. A Short History of Medicine. Oxford: At the Clarendon Press, 1962.